Performance Pay as an Incentive for Lower Absence Rates in Britain

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Abstract:

Using two cross-sections of a representative dataset of British establishments, the effect of various forms of incentive pay (e.g. performance-related pay (PRP), profit-sharing, share ownership, cash bonuses) on the absence rates of firms is investigated. Incentives that are tightly linked to individual or group merit are found to be significantly related to lower absenteeism. Important disparities in the effect of PRP on absenteeism are detected, which depend on the extent of monitoring, private-public status, teamwork, and other organizational changes. The findings are robust to the potential endogenous relation between monitoring, PRP and absenteeism, and have important implications for the design of optimal compensation policies by firms.

Keywords: performance-related pay, incentives, absenteeism.

JEL Classification: J22, J33, C21

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1. Introduction

There is an increasing amount of interest in recent years on the economics of absenteeism, spurred by a growing awareness that the economic and social costs (including sickness absence insurance, health care costs and early retirement costs) of the phenomenon are enormous. For instance, estimates for the UK have placed the figure at about £6 billion per year in the 1980s (Brown and Sessions, 1996), rising to approximately £11.6 billion in 1993 (Barham and Begum, 2005) and £17 billion in 2009 (CIPD, 2009). These figures correspond to 2-3% of total Gross Domestic Product (GDP), or a typical year's growth.[1] The latest calculations from the UK's Labour Force Survey also indicate that approximately 3% of contracted work hours are lost due to sickness absence, translating into an average annual absence of one and a half weeks for every UK employee (Ercolani, 2009). Though this figure is somewhat lower compared to other OECD economies (Barmby *et al*, 2004; Lucinyan and Bonato, 2007), it is still significantly larger than the proportion of time lost due to other major labour market events, such as strikes.

Though applied psychologists were the first to study the causes of worker non-attendance, attributing its incidence primarily to the existence of job dissatisfaction (Steers and Rhodes, 1978), economists originally viewed the phenomenon as a manifestation of the labour supply decisions of employees (Allen, 1981; Leigh, 1985). However, in the last decade a number of studies have turned their focus to the demand side of the market, and most notably to aspects of the labour contract that affect the cost of absence. For instance, several researchers have highlighted how appropriate manipulation of the wage and sick pay elements of the

[1] Most of these estimates are also unable to take into consideration the indirect costs of absence, such as recruitment of replacements to maintain an effective labour reserve, administrative expenses, bottlenecks in production, lower quality of work of the replacement workers, or effects on work climate.

compensation packages of employees can influence the cost of non-attendance (Barmby *et al*., 1991, Barmby *et al*., 1994; Johansson and Palme, 1996; Henrekson and Persson, 2004). A related strand of the literature has also paid close attention to the potential "disciplining" impact of the unemployment rate on absenteeism (Leigh, 1985; Arai and Thoursie, 2005; Askildsen *et al*. 2005). Finally, recent evidence has focused on the interdependent relationship between the incidence of worker absence and the nature of the production technology of firms, such as "just-in-time" inventory technology (Coles and Tremble, 1996; Coles *et al*., 2007), teamwork (Heywood and Jirjahn, 2004; Heywood *et al*., 2008), and firm size (Barmby and Stephan, 2000).

Given the emphasis of economists on elements of the job contract that interact with the cost of absence, an examination of the impact of performance-related pay (PRP) schemes on absence rates has been surprisingly neglected. The widespread employment in recent years of various types of financial incentives that complement the base pay of employees (e.g. PRP, bonuses, profit-pay, stock-options) has been extensively noted in the case of the UK (Bryson *et al*, 2007) as well as in other advanced Western economies (Prendergast, 1999). Furthermore, Allen (1981) identifies merit wage increases and attendance bonuses as two of the main "weapons" that firms can use to raise the penalty of absence for their employees. Of course, the adoption of PRP schemes by firms is likely to be dictated by a number of mediating factors related to their production process, such as the intensity of teamwork, the cost of monitoring, capital intensity and the nature of product market competition *inter alia* (Fernie and Metcalfe, 1999). It is therefore evident that an investigation of the PRP-absenteeism nexus may offer useful insights into the inter-relationship between firm technologies, personnel policies and the behavioural reactions of workers.

This paper attempts to examine the effect of PRP (individual or group PRP, merit pay, payment by results) on employee absence rates, using two cross-sections (1998 and 2004) of a representative dataset of British establishments, namely the Workplace Employee Relations Survey (WERS). The WERS dataset allows the exploration of the impact of a wide and non-homogenous set of financial incentives (PRP, profit pay, share ownership, bonuses, deferred profit plans) on absenteeism, using a large random sample of all British enterprises. This contrasts with the limited number of (mostly managerial) studies in the past which have typically focused on specific industries (Wolf, 1974; Wilson and Peel, 1991; Brown *et al*., 1999; Engellant and Riphahn, 2004). The dataset used in this paper also permits the controlling of an extensive amount of firm heterogeneity, in particular of variables related to broader human resource (HR) and organizational practices. The study shows that, *ceteris paribus*, firms that offer PRP experience significantly lower absence rates in Britain. Important disparities in the intensity of the negative impact of PRP on absenteeism are also detected, which depend on the extent of monitoring, teamwork, public-private status and other features of firm production technology.

The structure of the paper is as follows. *Section 2* reviews the hypothesized relation between contingent-pay and worker absenteeism based on previous studies in the literature. *Section 3* describes the data that is used in this study, and presents some relevant descriptive statistics. *Section 4* outlines the main empirical methodology and findings, while *Section 5* engages in a number of important robustness tests and explores the heterogeneity in the empirical estimates further. *Section 6* concludes with a discussion of the implications of the analysis for the design of optimal managerial policies by firms.

2. Literature Review

2.1 Theoretical framework

The impact of PRP on the absence rate of employees can be analyzed within the conventional labour-leisure choice (Allen, 1981; Leigh, 1985) and principal-agent (Mirlees, 1976; Holmstrom, 1979; Holmstrom and Milgrom, 1987) paradigms of microeconomics. In the face of imperfect information, workers have an incentive to not show up for work if their desired hours of work are less than the hours specified in the employment contract. This is likely to be the case when the utility increments received by the consumption of additional units of leisure outweigh the cost of non-attendance, which amount to forgone wages (namely, the difference between the worker's salary and the amount of sick pay).[2]

Assume that workers wish to maximize their utility, defined over consumption (C) and leisure (L):

$$U = u(C, L) \qquad (1)$$

subject to budget (eq. 2) and time (eq. 3) constraints, shown below:

$$C = R + st^c - bt^a \qquad (2)$$

$$t^c = 1 - (L + t^a) \qquad (3)$$

[2] The costs of absenteeism also include a greater probability of dismissal, or a lower probability of promotion if not laid-off, but we refrain from investigating such penalties for the sake of simplicity.

where R is income from sources other than one's own labour, s is the basic salary paid to employees irrespective of their performance, and t^c stands for contractual working time. The latter is given by the difference between the total amount of time per day (normalized to one) and the added quantity of non-work time (which equals leisure plus absence hours, $t^a \in [0, t^c]$). Crucially, it is postulated that in order to encourage workers to reduce the amount of lost hours from work, firms tie the remuneration of their employees to their attendance record according to a linear wage schedule ($w = st^c - bt^a$), with b capturing the intensity of the "penalty" that workers must endure for each lost man-hour.

Assuming that full sick pay ($\sigma = st^a$) is paid to absent workers, the magnitude of b constitutes the only incentive for workers to regularly attend work. This can be seen after substitution of (2) and (3) into (1) and differentiation of the latter with respect to t^a, which results in the following first-order condition:

$$\frac{U_C}{U_l} = b \qquad (4)$$

The shadow price of absenteeism, in this simple case, is therefore equal to the intensity of the PRP element in the workers' compensation package. As b increases, the amount of lost man-hours decreases ($\partial t^a / \partial b < 0$).

2.2 Performance-related pay and absence

According to the standard principlal-agent model, in order to bring the conflicting interests of employers and workers into closer alignment, the former may link the pay of the latter to a set of

informative verifiable signals, such as the realization of output (assumed, in our case, to be a function of the time that workers are absent from work). The model then predicts that the total number of working hours will rise as workers respond optimally to the receipt of PRP, thus bridging the gap between t^c and t^a. It is therefore reasonable to expect that the absence rate of firms offering contingent pay will be lower than of those who pay fixed salaries, all other things equal. This conclusion is reinforced when one considers the implications of Lazear's (1986) model, which predicts that hard-working and diligent employees will self-select into PRP firms. Absent-prone workers will instead find refuge in firms offering alternative payment arrangements. Indeed, due to the greater effort and/or ability of those on incentive pay, a positive relationship between PRP and earnings (Seiler, 1984; Booth and Frank, 1999; Lazear, 2000) has been predicted. The higher level of earnings of workers in receipt of variable pay will therefore act as an incentive to workers to modify their absence behaviour by reducing the number of hours that they do not show up at work.

Brown and Sessions (2003) have suggested that work environments that are believed to reward productivity and honest behavior are preferred by employees. PRP schemes, after all, constitute part of a bundle of human resource management innovations that are associated with the so-called new high performance workplace practices (HPWPs). Indeed, Marsden (2009) has argued that most of the positive effect of PRP on productivity can be indirectly attributed to the fact that its introduction is often a facilitator of other wider management and organizational changes. Since it has been argued that HPWPs breed greater feelings of belonging, esteem and commitment by a firm's workforce, absenteeism may be negatively related to PRP via such an avenue. Evidence that HPWPs and gain-sharing schemes are associated with higher job satisfaction (Bauer, 2004; Green and Heywood, 2008; Pouliakas and Theodossiou, 2009) also

supports the prediction of an inverse relationship between PRP and absenteeism in this regard. The above arguments draw attention to the fact that if one is to uncover the 'pure' effect of PRP on the absence rate, it is essential to control for an extensive package of firm-specific HR practices.

Despite the above conjectures, the provision of PRP may be related to an increase in the absence rate for a number of reasons. It has been argued that contingent payment schemes undermine valuable teamwork by fostering an individualistic organizational culture that is permeated by jealousy and envy (Milgrom and Roberts, 1992; Drago and Garvey, 1998; Marsden and French, 1998). Furthermore, aggressive PRP systems are believed to heighten the power asymmetry between supervisors and the workforce (Kohn, 1993). Psychological concerns over a potential "crowding-out" effect have been raised, which posit that the use of extrinsic incentives may erode intrinsic motivation and satisfaction, with adverse effects on productivity and, subsequently, turnout at work (Deci, 1971; Lepper *et al*, 1973; Frey and Jegen, 2001). In general, the use of PRP has often been associated with dissatisfaction with the amount of stress experienced by workers (Pouliakas and Theodossiou, 2009), an increased incidence of workplace injuries (Freeman and Kleiner, 2005), and low morale, especially amongst the least productive and lower-paid members of the workforce (Drago, 1996; Fernie and Metcalfe, 1999; McCausland *et al*., 2005). One would therefore expect that firms that compensate their workers using contingent pay arrangements are likely to suffer from higher absence rates as a consequence.

From the conflicting hypotheses outlined above, it becomes evident that the overall effect of PRP on absenteeism is ultimately an empirical question. A number of econometric studies have verified that PRP is associated with substantially positive productivity effects (Prendergast,

1999; Lazear, 2000, Gielen *et al*., 2006), though they have not directly examined whether the rising output per worker is related to falling absence rates. A notable exception is the study of Engellandt and Riphahn (2004), who inspect a panel data set of 6500 employees in a large international company. They find that although the offer of various incentive prizes (i.e. a 'surprise bonus' scheme, along with a more structured system of individual-performance rewards) is linked to greater worker effort, there is an insignificant relation with absenteeism. Similarly, Wolf (1974) identifies a non-measurable effect of an attendance incentive program in a US wood processing firm on the absence behavior of its *short-term employees*. He illustrates, though, that the incentive plan favourably influenced the work attendance of *permanent employees* of the company, who did not suffer from time-inconsistency problems.

Frick *et al*. (2008) unearth significant hidden absenteeism costs in the use of performance pay accrued to teams, but not individuals, in a German steel plant over the period 1992 to 2001. In particular, they illustrate that teamwork combines with PRP to significantly raise absence rates. They attribute this finding to the fact that, with teamwork, production units can produce 'spare effort' by covering for absent colleagues without undue disruption in the production process. They then argue that a common problem with most bonus payments within firms is that they are capped. This generates perverse incentives for workers to 'backload' their absence days towards periods in which they anticipate that they will be able to meet their targets, a phenomenon which can be sustained more easily when teamwork is present.

Added to the list of potential reasons for which PRP may backfire is the payment of relatively small rewards stretched over an extended qualifying time period (Wolf, 1974). Schnebller and Kopelman (1983) show that in the case of an US industrial textile manufacturer, an attendance

bonus plan was not merely ineffective, but was actually detrimental to the organization, as it eventually led to an increase of 12.3 percent in the absence rate.

By contrast, a number of research papers have confirmed the beneficial impact of financial rewards, in particular of gain-sharing schemes, on absence rates. The meta-analytical review of potential absence control methods undertaken by Wagner and Bankshares (1990) indicates that financial incentives work, though they are found to have a moderate effect in reducing absenteeism. Wilson and Peel (1991) use data from 52 engineering and metal working firms in the UK in 1983-84, and show that firms with employee financial participation schemes (i.e. profit-sharing and share ownership) had significantly lower average absenteeism and quit rates than those without such incentive mechanisms. Statistically significant reductions in absenteeism (in the 7-14 percent range) in response to employee participation schemes were also detected in a panel sample (1981-1991) of 127 French firms used by Brown *et al*. (1999). Using a longitudinal dataset, Arthur and Jelf (1999) highlighted the positive effect over time of a so-called Scalon-type gainsharing plan (i.e. a combination of plant-wide bonuses plus a comprehensive employee involvement program) on two plant-level performance indicators, namely grievance rates and employee absenteeism. Furthermore, Jacobson (1989) has showed that teacher absence in one New York district declined significantly and their attendance rose from 8 percent to 34 percent during the first year of an attendance incentive plan. Finally, the study of Hassink and Koning (2005) is unique in that it investigates the effectiveness of an innovative monthly lottery scheme, specifically engineered for reducing sick leave by awarding worker attendance, by a Dutch manufacturing firm. The study confirms the highly beneficial incentive effects of the lottery, as it is found to decrease the rate of sick leave by 1.6 percentage points.

The research described above shows that the effect of financial incentives on absence varies to a considerable extent according to the type of incentive scheme (PRP, bonuses, profit pay, employee share ownership), the nature of the product market, the industry studied *inter alia*. A contribution of the present research is that it investigates the association between PRP and absenteeism by utilizing a representative sample of *all* UK enterprises, whilst controlling for a wide range of firm-specific heterogeneity. It also follows McNabb and Whitfield (2007) in broadening the definition of variable pay to include various forms of contingent rewards (e.g. payment by results either at individual or group level, merit pay, cash bonuses, profit-pay, employee share-ownership), rather than using a catch-all definition of PRP that has been the norm in previous literature (Brown, 1992; Booth and Frank, 1999).

2.3 Other determinants of absenteeism

In order to detect the *ceteris paribus* relation between financial incentives and the absence rate of British firms, a number of determinants of absenteeism are taken into consideration, as identified in the relevant literature (e.g. Heywood *et al*., 2008). These include variables describing the structure of the workforce, such as the proportion of female employees per establishment, who are well-known to exhibit more pronounced patterns of absenteeism (Leigh, 1985; Barmby *et al*., 1991; Vistnes, 1997; Ercolani, 2009). The shares of younger, disabled and ethnic workers are also controlled for to further capture the demographic composition of firm personnel.

Explanatory variables that reflect the working time schedules of companies are included as covariates, since these have important implications for the mismatch of desired and contractual hours (Drago and Wooden, 1992; Brown and Sessions, 1996). They include whether employees engage in shift work, whether they are entitled to the option of an annualized hours scheme and

the share of workers on part-time contracts. All of these variables summarize the extent to which the constraint of contractual hours is relaxed, and are therefore expected to be associated with lower employee absence. Nevertheless, it is those firms which find absence to be less costly that are more likely to offer flexible working time schedules, so the effect of non-binding hours on absence may eventually be positive on average. Shift work and irregular working time patterns have also been shown to interfere with the biological and social rhythms of employees (Finn, 1981), resulting in a higher physical and mental burden.

Elements of the nature of production technology of firms are taken into account, such as industrial groupings, as well as the share of occupational groups within establishment. The latter is an important explanatory variable, as it is well-known that the provision and intensity of incentive pay is likely to vary by occupational type (e.g. managers, sales workers etc.). The size of the establishment (and of the organization) and its age is considered too, given evidence that absenteeism is more pronounced within larger-sized firms (Barmby and Stephan, 2000) and those which have not yet reached full maturity. Following the predictions of Coles *et al*. (2007), a dummy variable describing whether firms use "just-in-time" production technologies is included in the specification, as the cost of absence is argued to be higher for such enterprises. Indicators of the existence of teamwork within the workplace are considered as well (Heywood and Jirhahn, 2004; Heywood *et al*., 2008), as these are acknowledged to play a crucial part in moderating the impact of PRP on absence. The proportion of employees on fixed term contracts and the share of temporary agency employees are used as proxies for the degree of contractual flexibility in the workplace, which has been shown to be related to the absence rate in a negative fashion (Bradley *et al*., 2007). Finally, employees in public sector enterprises are generally found to exhibit a greater tendency of being away from work (Scoppa, 2008).

Economic incentives that may directly affect the cost of lost man-hours are also taken into consideration, such as the share of employees within various earnings bands (Allen, 1984; Tremble, 2001), as well as the unemployment rate (by travel to work area). In contrast, the provision of sick pay in excess of statutory requirements by firms is identified, given evidence that such a fringe benefit may have a direct disincentive effect on their attendance record (Barmby *et al*., 1991).

A number of variables that describe the quality of industrial relations are included in the main regression equation. The extent of trade union density within establishments is allowed for, given evidence of a positive link between unionization and absenteeism (Allen, 1984; Chaudhury and Ng, 1992). Other indicators of employee empowerment practices which are considered include the presence of joint consultative committees, health and safety committees and briefing groups. An overall control for the quality of relations between management and employees at the workplace is also used, as good relations between the two tiers is likely to not only facilitate the successful implementation of a PRP scheme, but also to result in lower absence.

Particular attention in the empirical analysis has been paid to controlling for an important variable that is endogenously determined with the offer of PRP by firms, namely the extent of employee monitoring. Following Goldin (1986), this is proxied by the percentage of non-managerial employees whose job duties involve the supervision of other employees.

Finally, we include dummies that capture any differences in the absence rates of the British regions.

3. Data and Methodology

3.1 Data and Descriptive Statistics

Our data are derived from the 1998 and 2004 Cross-Section Workplace Employee Relations Survey (WERS). These are the fourth and fifth instalments of a Government funded series of surveys conducted at British workplaces. The previous surveys were conducted in 1980, 1984 and 1990.[3]

The sample of workplaces was randomly drawn from the Interdepartmental Business Register (IDBR). This is maintained by the Office for National Statistics (ONS) and is considered to be the highest quality sampling frame of workplaces available in the United Kingdom. The sample is stratified by workplace size and industry and larger workplaces and some industries are overrepresented (Chaplin *et al*., 2005). A workplace is defined as the activities of a single employer at a single set of premises.

The survey comprises three main sections; the 'Management Questionnaire' (face-to-face interviews with senior managers with day-to-day responsibility for employee relations), the 'Worker Representative Questionnaire', and the 'Employee Questionnaire'. The survey population for the Management Questionnaire is all British workplaces barring those in agriculture, hunting and forestry, fishing, mining and quarrying, private households with employed persons, and extra-territorial organisations.

The response rate in the 1998 (2004) Management Questionnaire was 80% (64%) (see Airey *et al*. (1999) and Kersley *et al*., (2006) for reasons why the response rates differ]. Changes in the nature of interest in employment relations led to substantial redesign of the 2004 wave. A major

[3] There is a panel element of the management questionnaire in the WERS, but unfortunately it does not contain information on absence rates. Thus, we treat the 1998 and 2004 waves as two single cross sections.

modification was the incorporation of small workplaces (i.e. those employing between 5 and 9 employees). There were also a number of changes to the format of the various survey questions (Kersley *et al*., 2006).

For the purposes of our study we employ data from the Management Questionnaire only as the Employee Questionnaire or the Worker Representative Questionnaire do not offer any information on absence. Thus, our 1998 (2004) sample comprises 2,173 (2,006) establishments. Due to the stratified nature of the survey, we weight our estimates in order to be representative of the sampling population. Summary statistics of our variables of interest are presented in Table A1 in Appendix A.

The Management Questionnaire collected data from managers about the pattern of employee non-attendance in the workplace. The exact question is phrased "*Over the past 12 months what percentage of work days was lost through employee sickness or absence at this establishment? Please exclude authorized leave or absence, employees away on secondment or courses, or days lost through industrial action*".

Among workplaces where managers were able to provide an answer, the average rate of absenteeism in 1998 (2004) equates to a loss of 3.8 (4.2) percent of working days per establishment. Figures 1 and 2 present the distribution of absence rate across workplaces as reported in the 1998 and 2004 waves, respectively. Both distributions are skewed to the right, but there is no excess concentration of zero observations.

[INSERT FIGURES 1 & 2 HERE]

The percentage of missing responses was 15.7% in 1998 and 15.4% in 2004, respectively. In order to retain the full amount of available information in the dataset, we do not drop these missing responses in the empirical analysis. Instead, we recode them as zero values of the

dependent variable and add a dummy variable which is equal to one if there is missing absence information, zero otherwise.

Managers were also asked questions regarding the provision of different forms of variable pay schemes in their workplace. Amongst these options, the offer of PRP is explicitly identified, though it is specified in a different manner between the 1998 (individual or group PRP) and 2004 waves (payment by results and merit pay). Table A1 in Appendix A provides a detailed set of definitions for the contingent pay variables of interest.

To acquire an initial picture of the relationship between the absence rate and the various mechanisms of incentive pay, Table 1 provides some simple cross-tabulations of these variables. Both tables suggest that PRP schemes are associated with lower absence rates. Overall, these results tentatively appear to be consistent with the theoretical framework which predicts that firms which offer financial incentives are expected to have lower absence rates.

[INSERT TABLE 1 HERE]

3.2 Econometric Methodology

Our equation of interest is:

$$Absence_j = \beta_0 + \beta_1 PRP_j + \beta_2 VP_j + \beta_3 W_j + \beta_4 I_j + \beta_5 R_j + \varepsilon_j \qquad (4)$$

The dependent variable $Absence_j$ indicates the absence rate of establishment *j*, where $j = 1,\ldots,N$, PRP_j captures the offer of PRP schemes within the establishments, VP_j is a vector of control variables referring to the provision of other types of variable pay by firms, such as financial participation schemes (e.g. profit pay, share ownership, cash bonuses), W_j summarizes various workplace characteristics, I_j captures industry fixed effects, R_j stands for region fixed effects

and ε_j is the establishment-specific error term. As is standard, unbiased ordinary least squares (OLS) coefficients of the effect of PRP on *Absence* will be obtained provided that $E(\varepsilon_j \mid \mathbf{X}) = 0$, where $\mathbf{X}$ = {*PRP, VP, W, I, R*}.

Given that $Absence_j$ is a fractional response variable, concerns have been raised with respect to the validity of estimates obtained via the method of least squares. Indeed, when a dependent variable is restricted to a unit interval [0,1], Papke and Wooldridge (1996) suggest that a log-odds transformation, or a logistic model, may be more appropriate than OLS. Nevertheless, when the range of values of the bounded variable is not heavily concentrated at the interval boundaries, no significant differences between OLS and logistic estimates arise. To confirm this assertion, a generalized linear model (GLM) has been estimated, which assumes that the logit transformation of *Absence* comes from the family of binomial distributions.[4] As no significant differences are detected between the estimates of the GLM and OLS models, the ensuing discussion presents the main findings of the analysis obtained via application of a standard OLS methodology.

4. Empirical Results

Table 2 presents the estimated effect of the main PRP and other variable pay variables on the absenteeism of British establishments for both years of data.[5] It is evident that after holding constant various other types of financial incentives that firms employ, PRP emerges as a scheme

[4] The results of this estimation procedure are available from the authors upon request.
[5] The regression coefficients of the remaining explanatory variables are found to correspond in most cases with the predictions of prior literature. Due to space limitations, they are not discussed in the main text, though the reader is referred to Table A3 in Appendix A for further details.

that exerts an independent and significant negative effect on the mean absence records of British establishments.

Specifically, column 1 in the top panel of Table 2 suggests that, *ceteris paribus*, firms which offer "*individual or group performance-related schemes*" in the 1998 dataset have a 0.6 percentage point lower absence rate compared to firms without such schemes. For a mean absence rate of 3.8 percentage points (sample absence mean in 1998), the true effect is therefore equal to -15.8 [(-0.6/3.8)*100]} percentage points, which is a considerable amount. A significant negative effect on absenteeism of a slightly lower magnitude (-13.2%) is also found with respect to the provision of "*other cash bonuses*" by firms. In contrast, no evidence of a link between absence and various forms of financial participation schemes (profit pay, share ownership, deferred profit-sharing plans) is discovered.

Column 2 in the upper panel of Table 2 presents similar results from the 2004 WERS, although the PRP variable is defined differently. The results offer further support to the argument that linking employees' pay to performance is likely to have an effect on their absence behavior, with the magnitude of the effect corresponding closely to that of the 1998 data. Specifically, the overall PRP variable is broken down into its two constituent parts, namely *payment by results* and *merit pay*. Furthermore, since merit pay is only relevant for non-managerial occupational groups, the sample is restricted accordingly by excluding the subset of firms that offer PRP only to managerial employees (i.e. 115 establishments). Interestingly, it is found that in the 2004 data PRP exerts a negative effect on absenteeism (at the 5% level) only when rewards are made contingent on the merit of non-managerial employees.

In particular, the regression coefficient suggests that establishments which offer merit pay have a 0.7 percentage point lower number of lost workdays than establishments which do not

offer such compensation. For a mean absence rate of 4.2 percentage points (sample absence mean in 2004), this translates to a decrease of 16.7 [(-0.7/4.2)*100)] percentage points in the absence rate.

[INSERT TABLE 2 HERE]

Table 3 delves more into the nature of the various methods of incentive pay that modern competitive organizations employ, by taking into consideration that there are potentially significant interactions between them. In the spirit of Bryson *et al*. (2007), we explore the possibility that establishments make use of more than one type of variable pay and also that they may utilize alternative configurations of the different reward mechanisms at their disposal. For instance, firms may use merit pay to target individual productivity, whilst offering profit-related pay to strengthen the commitment of the workforce towards the organization's goals. Deferred profit schemes may be used instead in situations where the output of employees cannot be accurately observed or measured, or as a means of sorting out highly-committed workers (Salop and Salop, 1976).

Table 3 presents results where the number of different variable pay schemes a given establishment may have on offer is measured. It is evident in both waves that the higher the number of such schemes used by an establishment, the greater is the effect on its absence rate. The 1998 results indicate that the effect of having five PRP schemes is more than double the effect of having only one such scheme in place. Having five PRP schemes reduces the establishment absence rate by as much as 39.5 percentage points. The equivalent finding from the 2004 wave (three schemes) indicates that firms which employ multiple forms of non-standard

wage schemes are likely to benefit from a lower amount of lost workdays by around 28.6 percentage points.[6]

[INSERT TABLE 3 HERE]

The extensive information available in the WERS data permits the further investigation of the impact of the *coverage* of PRP schemes on absenteeism. Specifically, managers were asked to reply to the question: "*What proportion of non-managerial employees at this workplace have received performance related pay in the last 12 months?*"[7] The available responses are then grouped into three broad categories: "1-39%", "40-79%" and "80-100%", the omitted category being "None". The results (see Table 4), especially those of the 2004 wave, are indicative of the fact that firms that have more extensive coverage of PRP are likely to enjoy lower absence rates.

[INSERT TABLE 4 HERE]

Moreover, it is possible to scrutinize further what is the *measure of performance* which is most likely to trigger the significant negative impact of PRP on absenteeism. In particular, managers were asked to unveil whether the amount of PRP that their employees receive is determined on the basis of (*i*) "Individual performance/output"; (*ii*) "Group or team performance/output"; (*iii*) "Workplace based measures"; (*iv*) "Organization based measures", or

[6] We tried specifications where we include 26 and 4 interactions between the different contingent pay schemes in the 1998 and 2004 samples, respectively. The results (available upon request) suggest that the negative impact of variable pay on absenteeism is driven strongly by the PRP schemes.

[7] Managers had to choose between the following categories: 1. "All" (100%), 2. "Almost all" (80-99%), 3. "Most" (60-79%), 4. "Around half" (40-59%), 5. "Some" (20-39%), 6. "Just a few" (1-19%), 7. "None". Given that this question was asked to non-managerial employees, we estimate the regressions for the non-managerial staff only. For this reason, the number of observations for the 1998 sample is reduced to 2,080 firms, as opposed to the 2,173 which comprised the original sample.

(*v*) "Other measures".[8] The 1998 results suggest that individual performance output and workplace-based measures are those that are associated with lower absence rates. Results from the 2004 sample, instead, imply that merit pay is likely to reduce absence rates when it is tied to workplace and organization-based objectives (see Table 5).

[INSERT TABLE 5 HERE]

5. Sensitivity Analysis

5.1 Interaction effects by public-private status

Despite being used more commonly in the British public sector in recent years, the value of PRP remains modest relative to the private sector (OECD, 2005). Significant attention has therefore been paid to understanding the reasons for the relatively infrequent use of explicit incentives in the public sector (Dixit, 2002; Burgess and Rato, 2003; Prendergast, 2008).[9]

The above assertions are confirmed in our dataset, as it is evident that there is a significant disparity in the provision of variable pay between the public and private sectors (see Table A4 in the Appendix). In particular, although it is found that a slightly lower proportion of public sector employees receive merit pay or PRP tied to individual or group performance relative to their private sector counterparts, there are striking differences in the incidence of other financial incentives. Specifically, public sector establishments make infrequent use of financial

[8] Given that this question was asked to non-managerial employees, we estimate the regressions for non-managerial staff only.

[9] Such arguments have typically focused on the more complicated nature of performance measurement in state-level jobs (e.g. multiplicity of tasks and outputs; lack of clear goals; absence of market price signals), the prevalence of multiple principals with sometimes conflicting goals and the crucial role of teamwork in the production of public goods. They have also highlighted the important selectivity issues that arise due to the presence of public service motivation (PSM). The above imply that the use of low-powered or no incentives at all may be optimal in order to avoid the so-called 'crowding-out' effect (Kreps, 1997; Frey and Jegen, 2001).

participation schemes (e.g. profit-pay, employee share-ownership, deferred profit sharing plans). Wide variations can also be observed between the two sectors with respect to the degree to which PRP is applied, with a significantly larger coverage in the private sector (amongst both managerial and non-managerial employees). Finally, there is a notable difference in the preferred measure of performance used in the design of PRP, with private sector firms giving greater emphasis to performance at the individual or group level.

The different nature of PRP provision in public and private sector establishments gives rise to the expectation that salient differences will exist in its impact on worker absenteeism between the two sectors. This a priori hypothesis is confirmed in Table 6, as it is shown that the positive worker attendance effect related to the use of individual or group/merit PRP, as shown in Section 4, is only relevant for *private sector* firms. In contrast, deferred profit sharing plans are found to be a significant absence control tool for companies in the *public sector*. This is reasonable, given that civil servants and other state employees have traditionally been motivated via service-incremental salary scales, though caution is warranted given the small number of public sector firms that employ such compensation plans in the dataset.

[INSERT TABLE 6 HERE]

Another interesting difference that is detected refers to the overall coverage of the PRP scheme. In particular, it is noticed that the negative effect of individual or group PRP on absenteeism in private sector firms is intensified when the coverage of the scheme extends to more than half of the non-managerial workforce. The same is not true for public sector establishments, as a significant effect is only found (in the 2004 data) when performance payments are less prevalent (i.e. they cover less than half of the non-managerial staff). This finding draws caution to the fact that the potentially beneficial impact of PRP on absenteeism

and productivity in the public sector may be blunted when PRP schemes become extensively formalized and wide-ranging.

5.2 Interaction with teamwork

As argued in Section 2, a common side-effect associated with the provision of PRP is that it is likely to spur conflict between co-workers, especially in settings where team production is the norm. To overcome such problems, and as a means of promoting perceptions of fairness and equity in pay, firms have made increasing use of collective performance schemes (at the team/unit or organization level) in recent times, despite the apparent free riding problems that may arise (Petrescu and Simmons, 2008). On the one hand, it is often suggested that the successful implementation of team compensation schemes hinges critically on the 'silent' effect of peer pressure (Kandel and Lazear, 1992), which may constrain individual workers from being absent from work or from exerting lower effort. On the other hand, the evidence of Frick *et al*. (2008) suggests that teamwork may combine with PRP to significantly raise absence rates. The authors attribute this finding to the fact that since production units can cover for absent colleagues when teams are present, workers who anticipate meeting their production targets are likely to take unauthorized absence taking advantage of the coverage provided by their fellow co-workers.

It is therefore of interest to examine closely the interrelationship between teamwork, the provision of performance pay and absenteeism. Based on the evidence of Heywood and Jirjahn (2004) and Heywood *et al*. (2008), the incidence of teamwork *per se* is associated with a lower absence rate, due to the higher marginal cost of non-attendance for firms whose output is subject to productive interactions among employees. Nonetheless, the concurrent provision of PRP may

give rise to opportunistic behavior of the type described by Frick *et al*. (2008). In fact, evidence of such conduct is evident in both waves, apparent by the positive interaction between the PRP variables and various indicators of teamwork within the workplace (see Table 7). This interaction suggests that the negative effect of PRP on the absence rate is muted in firms which rely more heavily on formally designated teams.

[INSERT TABLE 7 HERE]

5.3 Other interaction effects and robustness checks

A number of sensitivity tests have been carried out in order to verify that the negative effect of PRP is robust, shown in Table 7.

First, given that firms that offer PRP have been shown to offer higher wages on average (McNabb and Whitfield, 2007), it is verified that the magnitude of the PRP coefficient is not affected by the exclusion from the specification of variables describing the distribution of earnings within establishments. Interestingly, it is found in the 2004 (1998) data that the impact of PRP is more (less) pronounced in firms which have a greater share of lower (higher)-paid workers, presumably due to the greater incentive power that an additional unit of a bonus is likely to have on workers on the lower rungs of the income distribution.

Furthermore, as is predicted from the principal-agent model, workers who are in receipt of PRP are likely to optimally increase their average working hours. This may result in a decrease of the absence rate of firms, given that the discrepancy between the desired and contractual hours of work will be narrowed. For this reason, a variable capturing the average duration of the normal working week for full-time employees in the largest occupation group has been added to the 1998 regression. As expected, it is found that absenteeism is lower within those firms in

which the normal hours of work are greater. More important for our purposes, it is confirmed that the magnitude of the PRP estimate remains unaffected after the inclusion of the hours variable in the specification, thus denoting that the significant absenteeism effect of PRP is not merely a reflection of the hours channel. Nonetheless, a positive interaction effect between PRP and the duration of hours signifies that the potential of the former to decrease absenteeism is constrained once employees have reached a given maximum threshold of working hours. A similar conclusion can be derived by the fact that the impact of PRP on absenteeism becomes smaller as the share of employees working overtime increases within establishments.

Pouliakas and Theodossiou (2009) have shown that PRP increases workers' dissatisfaction with the amount of stress at work, while Freeman and Kleiner (2005) have shown a significant correlation between PRP and workplace injuries. As the definition of the dependent variable used in this study refers to workdays lost through both *employee sickness* or *absence*, it is interesting to determine whether the detected effect of PRP arises due to the impact on sickness or workplace injuries, or if it predominantly affects the part of absence that is related to 'shirking' behaviour. In order to examine this issue, two additional control variables have been added to the regression that capture the proportion of employees that have sustained certain types of injuries (e.g. bone fracture, amputation, loss of sight etc.) or illnesses/disabilities/other physical problems (e.g. skin or respiration problems, stress, musculoskeletal disorders) during working hours in the previous year of the survey. Even though the illness (but not the injury) variable is found to have the largest and statistically significant effect on the dependent variable, the impact of PRP that is reported in Section 4 remains robust. This constitutes evidence that the beneficial attendance effect of PRP is likely to arise primarily because of greater employee effort and/or because of sorting of more diligent employees towards such firms.

Following Bokerman and Illmakunnas (2008), who highlight the interrelationship between harms at the workplace, job dissatisfaction and nonappearance at work, we have also attempted to control for differences in job satisfaction among employees by exploiting the matched employer-employee element of the database. Nevertheless, no evidence of statistical significance was found. In general, it is worth pointing out that no significant changes to the main conclusions of this paper were found when the individual employee information was aggregated and matched to the establishment data. This is likely to reflect the fact that both the PRP and absenteeism variables relate to the workplace rather than to individual workers.

According to OECD (2005), PRP is often seen by employers as a means of facilitating management changes at times when new priorities are emerging. In addition, in recent years PRP has generally been introduced alongside other innovative HR practices, as part of a package of measures designed to enhance the individualization of human resources via the delegation of responsibilities to lower-grade managers and the promotion of overall employee empowerment (Black and Lynch, 2004). It is therefore likely that the negative coefficient of PRP on absenteeism may simply be a reflection of the influence of such organizational changes and/or of various high performance workplace practices on the performance of British firms.

In order to examine whether the estimated effect of PRP is confounded by the fact it usually acts as a lever for organizational change, the PRP variable has been interacted with a dummy variable identifying those firms that did not introduce important organizational changes in recent years.[10] Interestingly, it is found in the 2004 wave that firms that did not introduce any important changes in the previous two years enjoy significantly lower absence rates on average.

[10] Such changes in management refer to whether the payment systems of firms were recently altered, or to whether their working time arrangements, their organization of their work and their work techniques were modified. In addition, they include cases whereby firms introduced a new technology, a new product/service or implemented initiatives of employee involvement.

Furthermore, the beneficial effect of PRP in terms of reducing the absence rate is diminished for such establishments (see Table 7). This result is supportive of the notion that the positive contribution of PRP on firm performance is conditional on it acting as a stimulus for the introduction of wider managerial changes.

Moreover, we investigate the possibility that the significant effect of PRP on absence arises since it is implemented as part of a complementary bundle of HR policies that involve, most notably, employee participation and empowerment. No strong indication is found in favour of this hypothesis, as we fail to find any significant interaction between PRP and the existence of briefing groups and joint consultative committees (i.e. committees of managers and employees primarily concerned with consultation). Nonetheless, evidence is found in the 2004 data which indicates that the negative effect of merit pay on absenteeism is moderated within those firms operating so-called quality circles or problem-solving groups (i.e. groups in the workplace that solve specific problems or discuss aspects of performance or quality).

The effectiveness of PRP as an absence control mechanism may be amplified (compromised) when interacted with other types of incentives (disincentives) utilized by firms. The WERS data allows the examination of any potential interdependency between the incentive potential of PRP and the decision of firms to offer sick pay in excess of statutory requirements, which should provide a motive to employees to increase their required days of leave. A priori one would expect to observe a smaller impact of PRP on absenteeism when the offer of contingent pay is counteracted by the offer of excess sick pay. Nevertheless, we fail to find any evidence of a significant interaction in this respect.

The incidence of absence in larger-sized firms is typically higher due to the fact that it is more difficult to monitor the behavior of workers and because of the "buffer stock" of available

employees that such firms can afford to employ (Barmby and Stephan, 2000). The interaction term between PRP and the size of the firm, however, indicates that it is smaller-sized establishments that are more likely to benefit from using PRP as an absence control instrument. When coupled with the conclusion drawn above regarding the negating influence of teamwork on PRP, one can draw the conclusion that the incentivizing effects of PRP are likely to be more pronounced in settings where individual employees are independently accountable for their effort.

Finally, an important criticism regarding the detection of the 'true' effect of PRP on firm performance is that cross-section estimates are likely to mask inherent unobserved differences in the *trend* of performance which is correlated with the introduction of PRP contracts (Prendergast, 1999, p. 43). In other words, it is probable that the negative effect of PRP on absenteeism may be spurious, to the extent that these lower absence rates exhibit a correlation over time. In such a case, the lower absence rates may be unrelated to the choice of PRP by firms, and reflect, instead, a historically downward trend of absenteeism within establishments using such variable remuneration schemes.

Controlling for such a process would, of course, require information on the productivity and absence records of firms over time, which is not available in the WERS dataset. Nevertheless, the 1998 data contains data describing the managers' subjective evaluation of whether labour productivity in their establishment has gone up or down compared with five years ago. The PRP variable is unaffected by the inclusion of these variables as additional controls in the specification. Moreover, no evidence of a significant interaction effect is detected which would imply that the effect of PRP on absenteeism is somehow modified by the trend of firm productivity.

5.4 Endogeneity of PRP and the interrelationship with monitoring

Despite the robustness of the negative coefficient of PRP in the absenteeism regression, the possibility that endogeneity and reverse causation underlie the significant correlation should be recognized. It is plausible, for instance, that firms which have lower absence records are more likely to utilize variable compensation methods in the first place, as their higher productivity and availability of scarce resources might act as a catalyst for the decision to adopt and implement a costly PRP remuneration scheme.

Another important avenue through which a negative correlation between PRP and absenteeism may arise is via the mediating effect of firm monitoring. Specifically, firms which face a higher rate of absenteeism are more likely to utilize extensive monitoring, as a means of counteracting non-attendance. A significant prediction of the principal-agent paradigm, however, is that the choice of PRP by firms is inversely related to the level of monitoring intensity. The negative relation between PRP and absenteeism, in this case, may therefore be an artifact of the data, reflecting the possibility that high absence firms are more likely to use monitoring instead of PRP as a potential absence control tool.

Finally, although the WERS dataset permits the inclusion of a wide set of variables capturing intricate elements of workplace relations and of managerial competences, some unobserved heterogeneity across establishments that confounds the PRP-absenteeism relationship may still be present. For example, the lower absence record enjoyed by a number of firms may be related to the superior managerial skills of their human resource departments, which may also facilitate the process of linking pay to employee performance within those establishments.

From the above arguments it is evident that in order to detect the true relationship between PRP and firm-specific absenteeism, one needs to account for the endogenous nature of the PRP

variable. In addition, the critical relationships between PRP, monitoring and absenteeism should be uncovered, whilst acknowledging that monitoring itself may be an endogenous variable.

To help reveal some of the underlying correlations, a regression equation describing the incidence of PRP has been fitted to the data using a probit estimator (see Table 8). It is hence confirmed that extensive monitoring used by firms (proxied by a proportion of supervisors that exceeds half of the non-managerial workforce) is associated with a smaller probability of PRP being employed as a method of remuneration. In addition, as shown by Heywood *et al.* (2008), monitoring is significantly related to a lower absence rate. Therefore, there appears to be an important discrepancy with respect to the method used by firms in order to combat absenteeism, with some firms eschewing the option of supervision in favour of using PRP (presumably when the cost of monitoring is dear). PRP is then found to reduce the absence rate in a manner that is unrelated to the intensity of monitoring. This is evident in column (2) of Table 8, from which it is clear that the significant negative effect of PRP on absenteeism persists even after the inclusion of the ordinal monitoring variable (M) in the main regression:

$$Absence_j = \beta_0 + \beta_1 PRP_j + \beta_2 VP_j + \beta_3 W_j + \beta_4 I_j + \beta_5 R_j + \mu M_j + \varepsilon_j \qquad (5)$$

The validity of the negative PRP coefficient is also ascertained by the fact that it persists after taking into account the possibility of endogeneity in the variable, as indicated by the testing methodology proposed by Smith and Blundell (1986) and Rivers and Vuong (1988). This methodology seeks to identify whether there is any correlation between the errors of the structural equation of absence, ε_j, and those of two reduced-form regression equations, one for

the provision of PRP (probit) and another for the existence of monitoring in the workplace (ordered probit):

$$PRP_j = Z_j'\theta + v_j \quad (6)$$

$$M_j = Q_j'\phi + n_j \quad (7)$$

where $\boldsymbol{Z_j}$ represents a vector of exogenous variables that affect the incidence of PRP and $\boldsymbol{Q_j}$ is a vector of the determinants of monitoring within firms. Both sets of covariates include at least one exogenous variable that is not included in the original set $\boldsymbol{X_j}$. $\boldsymbol{\theta}$ and $\boldsymbol{\varphi}$ are corresponding reduced-form parameters, and $\boldsymbol{v}$ and $\boldsymbol{n}$ represent the respective error terms corresponding to the *j*-th establishment. Wooldridge (2002) has shown that provided that consistent coefficients, $\hat{\theta}$ and $\hat{\varphi}$ of $\boldsymbol{\theta}$ and $\boldsymbol{\varphi}$ are obtained, the estimated generalized residuals $\hat{v}_j = PRP_j - Z_j'\hat{\theta}$ and $\hat{n}_j = M_j - Q_j'\phi$ can be included as additional covariates in an augmented absence equation:

$$Absence_j = \beta_0 + \lambda\hat{v}_j + \xi\hat{n}_j + \mathbf{X}_j\beta + \mu M_j + \varepsilon_j \quad (8)$$

The presence of endogeneity in the OLS coefficients of PRP_j and M_j is then detected via a test of the joint significance of the coefficients of the two residual terms: $H_0 : \hat{\lambda} = \hat{\xi} = 0$.

In order to implement the above procedure, the set of explanatory variables, $\boldsymbol{X_j}$, has been augmented with a number of identifying restrictions. These instrumental variables (IVs) are chosen to be strongly correlated with either of the two endogenous variables, but not related in any causal manner with the absence rate. Although it is acknowledged that the selection of reliable instruments is a difficult and sometimes *ad hoc* process, the specific instruments used to

identify equation (6) is as follows; *1998 wave*: whether firms use individual or team objectives and targets as the main method to make employees in the largest occupational group aware of their job responsibilities; whether management introduced any change in the organization of work in the past five years. *2004 wave*: whether the organization is UK and foreign owned/controlled; and if a single individual or family own at least 50 percent of the company. Similarly, equation (7) is identified with the addition of the following variables that we anticipate to influence monitoring: *1998 wave*: management did not introduce any change in the past five years; *2004 wave*: Manager is the proprietor/owner of the firm.

This choice of the aforementioned instruments can be justified as it is expected that firms which employ individual/team objectives, those which have undergone organizational changes in the recent past, and those whose ownership transcends domestic barriers, are more likely to make use of innovative compensation rewards, such as PRP. By contrast, the nature of incentive provision within establishments that are predominantly owned by a single individual or family is expected to be geared by factors other than financial rewards, a finding which is confirmed by the significant negative coefficient in the estimation of the PRP equation. Similarly, companies which did not undertake any significant changes in previous years, and those in which the manager is concurrently the owner of the firm, are less likely to require supervising employees. Yet, there is no strong reason to believe that these variables are causally related to the (present) absence record of establishments. Indeed, the lack of correlation between the selected IVs and absenteeism is confirmed via separate OLS absenteeism regressions that include the IVs as extra controls in the specification. In all cases the selected IVs are found to be unrelated to absenteeism, at statistical significance levels that exceed by far what are regarded to be

acceptable thresholds. It has also been corroborated that the chosen IVs for the PRP equation are insignificant determinants in the monitoring function, and vice versa.

Importantly, as shown in column (3) of Table 8, the residuals $\hat{v}_j$ and $\hat{n}_j$ are insignificant variables when inserted into equation (8) as extraneous explanatory variables. A test of their joint significance also fails to reject the null hypothesis of exogeneity of the two variables, PRP_j and M_j [F(2,1432) = 0.18 (1998); 0.19 (2004)] No support is therefore found in favour of the hypothesis that PRP, monitoring and absenteeism are endogenously related.

Given the binary nature of the PRP variable, we have estimated a "treatment effects" model as a final step towards uncovering the non-endogenous effect of PRP. Initially, the estimation procedure has allowed for the monitoring variable to be included as an exogenous independent variable in the absence equation. A separate regression has then been undertaken that subsumes M_j into the error term, ε_j. The same set of instruments has been used as described above. In both cases and in both waves, the statistically significant negative effect of the PRP variables on absenteeism are found to persist, while the magnitude of the coefficients almost doubles (see column (4) of Table 8).

[INSERT TABLE 8 HERE]

6. Conclusion

Using two cross-sections (1998 and 2004) of a representative dataset of British establishments, the effect of various forms of incentive pay (e.g. PRP, profit-sharing, share ownership, cash bonuses) on the absence rates of firms are investigated. Incentives that are tightly linked to individual or group merit are found to be significantly related to lower absenteeism. This finding

is shown to be robust to the potential endogenous relation between monitoring, PRP and absenteeism.

The conclusion that PRP is associated with a lower absence rate, however, does not imply that PRP is likely to be an (equally) effective absence control tool when used by all British firms. Whether PRP is a suitable compensation method ultimately depends on the production technology of enterprises. For example, it is shown in the paper that the negative effect of PRP on absence is only found in private sector firms, and that the extent of the impact is likely to be muted within those establishments that rely heavily on teamwork. Public sector firms and those which have interdependent production should therefore be wary of using PRP to combat absenteeism. Finally, another important implication of the study for the design of optimal remuneration policies by firms is that PRP is more likely to be influential when associated with wider organizational and managerial restructuring.

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Figure 1. Distribution of Workplace Absence Rate in the 1998 WERS.

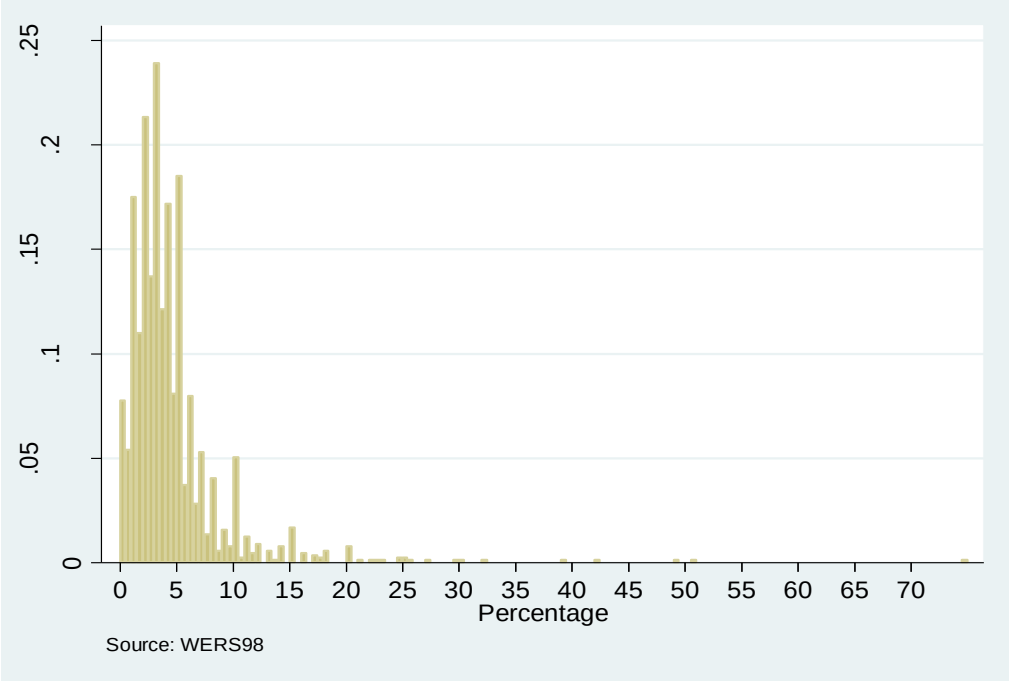

Figure 2. Distribution of Workplace Absence Rate in the 2004 WERS.

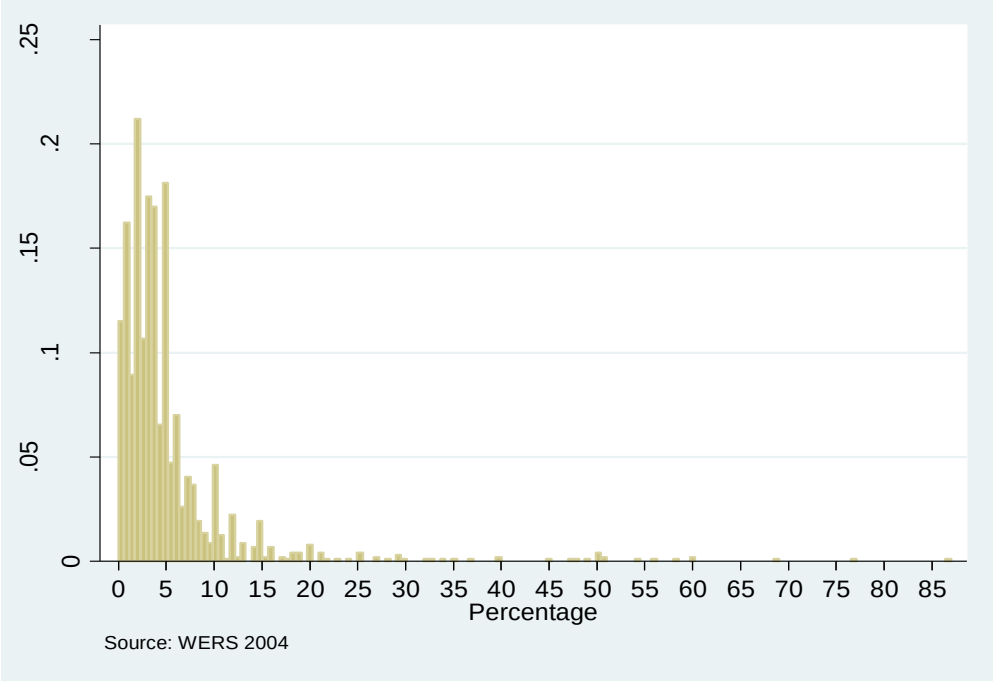

Table 1. Work Days Lost Through Employee Sickness or Absence by Type of Variable Pay Scheme.

	1998		2004	
	Yes	No	Yes	No
PRP				
Individual or group performance related-schemes	0.034 (0.029)	0.040 (0.052)	---	---
Payment by result	---	---	0.038 (0.047)	0.044 (0.066)
Merit pay	---	---	0.036 (0.046)	0.044 (0.064)
Financial Participation Schemes				
Profit related pay	0.036 (0.034)	0.039 (0.053)	0.038 (0.051)	0.044 (0.065)
Employee share ownership schemes	0.038 (0.044)	0.038 (0.047)	---	---
Other forms of Variable Pay				
Deferred profit sharing scheme	0.036 (0.033)	0.038 (0.047)	---	----
Other cash bonus	0.034 (0.032)	0.039 (0.050)	---	---

Notes. Means are weighted. Standard deviations in parentheses. "---" implies that the variable is not present in the respective wave.

Table 2. Effect of Performance-Related Pay Schemes on Absence Rates.

	1998	2004
Dependent Variable: Absence Rate		
PRP		
Individual or group performance related-schemes	-0.006** (0.002)	---
Payment by result	---	-0.002 (0.003)
Merit pay	---	-0.007* (0.003)
Financial Participation Schemes		
Profit related payments (or profit-related bonuses)	-0.003 (0.003)	-0.001 (0.003)
Employee share ownership schemes	0.0002 (0.004)	---
Other forms of Variable Pay		
Deferred profit sharing scheme	-0.002 (0.003)	---
Other cash bonus	-0.005* (0.002)	---
Number of observations	2,173	2,006

Notes: The dependent variable is the absence rate. Full controls are included as in Table A3 in Appendix A. Robust standard errors are in parentheses. Levels of significance: ** 1%, * 5%, + 10 %.
"---" implies that the variable is not present in the respective wave.

Table 3. Effect of Number of Performance-Related Pay Schemes on Absence Rates.

	1998	2004
Dependent Variable: Absence rate		
One scheme	-0.007* (0.003)	-0.003 (0.003)
Two schemes	-0.010** (0.004)	-0.005 (0.004)
Three schemes	-0.009+ (0.005)	-0.012* (0.005)
Four Schemes	-0.014* (0.006)	---
Five Schemes	-0.015+ (0.008)	---
Number of observations	2,173	2,006

Notes: The dependent variable is the absence rate. Full controls are included as in Table A3 in the Appendix A. Robust standard errors are in parentheses. Levels of significance: ** 1%, * 5%, + 10 %. "---" implies that the variable is not present in the respective wave.

Table 4. Effect of Proportion of Non-Managerial Employees Who Received Performance-Related Pay in the Last 12 Months on Absence Rates (FPERNON variable)

Dependent Variable: Absence rate	1998	2004
1% to 39%	-0.006* (0.003)	-0.0003 (0.005)
40% to 79%	-0.007* (0.004)	0.0001 (0.005)
80% to 100%	-0.006** (0.002)	-0.009** (0.003)
Number of observations	2,080	2,006

Notes: The dependent variable is the absence rate. Full controls are included as in Table A3 in Appendix A. The "proportions" dummy variables have been used in place of the "individual or group performance-related schemes" in the 1998 sample and the "merit pay" and "payment by results" variables in the 2004 sample. Robust standard errors are in parentheses. Omitted category: None of the workers at the workplace received performance related pay in the last 12 months. Levels of significance: ** 1%, * 5%, + 10 %. The number of observations (2,080) for the 1998 WERS is less than the number of observations for the whole 1998 sample (2,173) as the FPRNON variable refers to non-managerial employees only.

Table 5. Measures of Performance Used to Determine the Amount of Performance-Related Pay (FMEASUR variable).

Dependent Variable: Absence rate	1998	2004
Individual performance/output	-0.009** (0.003)	-0.001 (0.005)
Group or team performance/output	-0.004 (0.005)	0.001 (0.004)
Workplace-based measures	-0.012** (0.003)	-0.007+ (0.004)
Organization-based measures	-0.003 (0.003)	-0.007+ (0.003)
Number of observations	2,080	2,006

Notes: The dependent variable is the absence rate. Full controls are included as in Table A3 in Appendix A. The "measures" dummy variables have been used in place of the "individual or group performance-related schemes in the 1998 sample and the "merit pay" and "payment by results" in the 2004 sample. Levels of significance: ** 1%, * 5%, + 10 %. The number of observations (2,080) for the 1998 WERS is less than the number of observations for the whole 1998 sample (2,173) as the FMEASUR variable refers to non-managerial employees only.

Table 6. Estimates of Performance-related Pay Schemes by Public-Private Status.

	1998		**2004**	
	Public	**Private**	**Public**	**Private**
PRP				
Individual or group PRP	-0.003 (0.003)	-0.008 (0.003)**	---	---
Payment by result	---	---	-0.007 (0.006)	-0.001 (0.003)
Merit Pay	---	---	-0.012 (0.008)	-0.006 (0.003)+
Financial Participation Scheme				
Profit Pay	-0.006 (0.006)	-0.003 (0.003)	-0.007 (0.013)	-0.002 (0.003)
Employee Ownership	---	-0.001 (0.004)	---	---
Other Forms of Variable Pay				
Deferred Profit	-0.026 (0.012)*	-0.002 (0.003)	---	---
Other cash bonus	-0.003 (0.003)	-0.005 (0.003)*	---	---
Coverage of workforce by PRP				
Less than half	0.000 (0.004)	-0.006 (0.003)+	-0.014 (0.008)+	0.004 (0.005)

More than half	-0.002 (0.005)	-0.009 (0.003)*	-0.008 (0.007)	-0.008 (0.003)*
N	668	1502	502	1503
F(68, 1433)	10.04**	12.63**	6.18**	12.03**
R^2	0.47	0.22	0.26	0.16

Notes: The dependent variable is the absence rate. Full controls are included as in Table A3 in Appendix A. Robust standard errors are in parentheses. Levels of significance: ** 1%, * 5%, + 10 %.
"---" implies that the variable is not present in the respective wave.

Table 7. Interaction Effects of PRP.

WERS 1998							
PRP (individual or group)	-0.009 (0.003)**	-0.008 (0.003)**	-0.039 (0.012)**	-0.017 (0.007)**	-0.018 (0.008)*	-0.004 (0.002)+	-0.004 (0.002)*
PRP*proportion employees earning £22-29k pa	0.034 (0.019)+						
PRP*proportion of employees earnings more than £29k pa		0.028 (0.016)+					
PRP*average duration of workweek (inc.overtime)			0.001 (0.000)**				
PRP*more than half of workforce on overtime				0.017 (0.009)+			
PRP*more than half of workforce in teams					0.016 (0.008)+		
PRP*size of firm: 10-25						-0.016 (0.008)*	
PRP*size of firm: 26-50							-0.015 (0.008)+
WERS 2004							
Merit pay	-0.006 (0.003)*	-0.011 (0.003)**	-0.007 (0.003)*	-0.011 (0.003)**			
Merit pay*proportion employees paid less than $4.50 per hour	-0.028 (0.016)+						
Merit pay*team members jointly decide on work		0.010 (0.005)+					
Merit pay*no organizational changes in last two years			0.017 (0.009)+				
Merit pay*qualitycircles				0.012 (0.006)*			

Notes: The dependent variable is the absence rate. Full controls are included as in Table A2 in Appendix A. Robust standard errors are in parentheses. Levels of significance: ** 1%, * 5%, + 10 %. "---" implies that the variable is not present in the respective wave.

Table 8. The Endogeneity of PRP.

	Absence				*First Stage*	
	(1)	(2)	(3)	(4)	(5)	(6)
	No control for monitoring	*Control for monitoring*	*Testing for endogeneity*	*Controlling for endogeneity*	*Probit PRP*	*Probit Monitoring*
WERS 1998						
Individual or group PRP	-0.006 (0.002)**	-0.006 (0.002)**	-0.013 (0.023)	-0.017 (0.006)**		-0.142 (0.113)
Monitoring: Less than half		0.006 (0.003)*	0.032 (0.046)	0.006 (0.003)+	-0.112 (0.138)	
Monitoring: More than half		0.004 (0.004)	0.031 (0.046)	0.003 (0.004)	-0.428 (0.212)*	
Residual PRP			0.009 (0.023)			
Residual Monitoring			-0.027 (0.046)			
IV: Employees made aware of responsibilities with one of individual or group targets					0.388 (0.113)**	
IV: Employees made aware of responsibilities via both individual or group targets					0.422 (0.113)**	
IV: Changes in work organization over last 5 years					0.242 (0.102)*	
IV: No changes in organization over last 5 years						-0.911 (0.222)**

Rho (correlation of absence and PRP equations)				5.16; p = 0.02		
N	2170					
WERS 2004						
Merit pay	-0.006 (0.003)+	-0.006 (0.003)+	0.015 (0.040)	-0.010 (0.006)+		-0.175 (0.122)
Monitoring: Less than half		-0.003 (0.005)	-0.015 (0.047)	-0.004 (0.005)	-0.165 (0.135)	
Monitoring: More than half		-0.006 (0.007)	-0.017 (0.047)	-0.006 (0.007)	-0.034 (0.236)	
Residual PRP			-0.021 (0.040)			
Residual Monitoring			0.013 (0.048)			
IV: Onwership of firm is UK and foreign					0.462 (0.193)*	
IV: Individual or family owns more than 50% of company					-0.258 (0.105)*	
IV: Manager is proprietor/owner						-0.475 (0.166)**
Rho (correlation of absence and PRP equations)				0.91; p=0.34		
N	1503 (*Private sector firms only)					

Notes: Full controls are included as in Table A3 in Appendix A. Robust standard errors are in parentheses. Levels of significance: ** 1%, * 5%, + 10 %.

APPENDIX A

Table A1. Definitions of the PRP variables of interest

Definition of PRP from the 1998 WERS

Do any employees at this workplace receive payment or dividends from any of the following variable pay schemes?

1. Profit-related payments or bonuses
2. Deferred profit sharing scheme
3. Employee share ownership schemes
4. Individual or group performance-related schemes
5. Other cash bonus
6. None of these

Definition of PRP from the 2004 WERS

Do any employees in this establishment get paid by results or receive merit pay?

(Interviewer: On this card is an explanation of what we mean by payment by results and merit pay. Probe: Which others? Until "None".

1. Payment by results
2. Merit pay
3. Neither

Card reads:

1. Payment by results

"Payment by results" includes any method of payment where he pay is determined by the amount done on its value, rather than just the number of hours worked. It includes commission, and bonuses that are determined by individual, establishment or organization productivity or performance. It includes profit-related pay schemes.

2. Merit pay

"Merit pay" is related to a subjective assessment of individual performance by a supervisor or manager.

Table A2. Descriptive Statistics of Control Variables of Interest

	1998	2004
Missing absence	0.157 (0.364)	0.154 (0.361)
Percent of employees earnings £22,000 to less than £29,000 per annum	0.086 (0.112)	0.071 (0.177)
Percent of managers	0.086 (0.097)	0.103 (0.105)
Percent of professional staff	0.129 (0.208)	0.109 (0.191)
Percent of technical staff	0.089 (0.156)	0.107 (0.195)
Percent of clerical and secretarial staff	0.157 (0.193)	0.151 (0.206)
Percent of craft and skilled service	0.104 (0.193)	0.072 (0.165)
Percent of personal and protective service	0.083 (0.206)	0.075 (0.204)
Percent of operative and assembly staff	0.128 (0.248)	0.096 (0.215)
Percent of sales staff	0.096 (0.225)	0.143 (0.274)
Percent of routine unskilled	0.124 (0.221)	0.136 (0.257)
Percent part time staff	0.263 (0.282)	0.268 (0.277)
Percent trade union staff	0.327 (0.339)	0.212 (0.307)
Percent of women	0.492 (0.288)	0.493 (0.294)
Percent of ethnic minorities	0.054 (0.109)	0.073 (0.148)
Percent of employees younger than 20 years old	0.061 (0.108)	0.090 (0.151)
Percent of employees older than 51 years old	0.157 (0.109)	0.200 (0.154)
Percent disable	0.009 (0.026)	0.010 (0.040)
Percent temporary agency employees	0.017 (0.052)	0.029 (0.098)
Between 5% and 25% of employee work on fixed-term contracts	0.515 (0.500)	0.407 (0.491)
More than 25% of employee work on fixed-term contracts	0.039 (0.194)	0.066 (0.248)
Manufacturing	0.226 (0.419)	0.156 (0.363)
Utilities (electricity, gas, water supply)	0.006 (0.079)	0.003 (0.059)
Construction	0.031 (0.174)	0.041 (0.199)
Wholesale	0.147 (0.355)	0.157 (0.364)
Hotels and restaurants	0.043 (0.202)	0.056 (0.231)

Transportation	0.056 (0.230)	0.067 (0.249)
Financial services	0.037 (0.188)	0.058 (0.234)
Other businesses	0.098 (0.298)	0.136 (0.343)
Other community services	0.033 (0.179)	0.051 (0.219)
Education	0.105 (0.306)	0.083 (0.276)
Health	0.139 (0.346)	0.138 (0.345)
Public sector establishment	0.304 (0.460)	0.239 (0.427)
East Anglia	0.082 (0.274)	0.088 (0.284)
Rest of the South East	0.145 (0.352)	0.137 (0.343)
South West	0.074 (0.262)	0.074 (0.262)
London	0.126 (0.332)	0.131 (0.337)
East Midlands	0.090 (0.286)	0.075 (0.263)
West Midlands	0.102 (0.302)	0.099 (0.299)
North East	0.047 (0.211)	0.039 (0.194)
North West	0.125 (0.331)	0.131 (0.337)
Scotland	0.094 (0.292)	0.095 (0.293)
Wales	0.042 (0.201)	0.044 (0.204)
Sick pay in excess of statutory requirements	0.771 (0.420)	0.692 (0.462)
System designed to minimize inventories, supplies or work in progress	0.328 (0.469)	0.273 (0.446)
Operating at this address or other for more than 5 years	0.899 (0.301)	0.915 (0.279)
Size of the establishment between 5 and 10 employees	---	0.101 (0.301)
Size of the establishment between 10 and 25 employees	0.138 (0.345)	0.170 (0.376)
Size of the establishment between 26 and 50 employees	0.143 (0.350)	0.142 (0.349)
Size of the establishment between 51 and 100 employees	0.137 (0.344)	0.135 (0.342)
Size of the establishment between 101 and 200 employees	0.137 (0.344)	0.122 (0.327)
Size of the establishment between 201 and 500 employees	0.186 (0.389)	0.142 (0.350)
Size of the establishment between 501 and 1,000 employees	0.092 (0.289)	0.079 (0.269)
Organization size 200 to less than 1,000 employees	0.085	0.119

	(0.278)	(0.324)
Organization size 1,000 to less than 5,000 employees	0.163 (0.370)	0.143 (0.350)
Organization size 5,000 to less than 50,000 employees	0.222 (0.416)	0.225 (0.418)
Organization size more than 50,000 employees	0.494 (0.500)	0.452 (0.498)
Working arrangements for non-managerial employees: annualised hours	0.097 (0.296)	0.143 (0.351)
Working arrangements for non-managerial employees: shift working	0.520 (0.500)	0.482 (0.500)
Specific health and safety committee	0.435 (0.496)	0.295 (0.456)
Teams jointly decide how the work is to be done	0.478 (0.500)	0.440 (0.497)
Joint consultative committee/work councils/representative forums	0.502 (0.500)	0.365 (0.481)
Briefing groups/team briefings	0.888 (0.316)	0.808 (0.394)
Relationship between management and employees is very good/good	0.862 (0.346)	0.897 (0.305)
Unemployment to vacancy rate by travel to work area	3.8 (1.59)	3.6 (2.5)
Number of observations	2,173	2,006

Notes: Means are weighted. Standard deviations in parentheses. "---" implies that the variable does not exist in the 1998 WERS.

Table A3. Effect of Control Variables on Absence Rates

	1998	2004
Dependent Variable: Absence Rate		
Missing absence (dummy)	-0.045**	-0.050**
	(0.002)	(0.002)
Percent of employees earnings £22,000 to less than £29,000 per annum	-0.023*	-0.018*
	(0.010)	(0.008)
Percent of managers	-0.005	0.022+
	(0.010)	(0.013)
Percent of professional staff	0.003	-0.005
	(0.008)	(0.009)
Percent of technical staff	0.0003	-0.015+
	(0.008)	(0.008)
Percent of clerical and secretarial staff	-0.008	-0.001
	(0.008)	(0.009)
Percent of craft and skilled service	0.019*	0.008
	(0.009)	(0.009)
Percent of personal and protective service	0.010	0.006
	(0.008)	(0.011)
Percent of operative and assembly staff	0.019	0.009
	(0.010)	(0.009)
Percent of sales staff	0.014	0.013
	(0.011)	(0.010)
Percent of routine unskilled	0.022*	0.032**
	(0.010)	(0.011)
Percent part time staff	-0.009	-0.014*
	(0.007)	(0.007)
Percent trade union staff	0.005	0.021**
	(0.004)	(0.006)
Percent of women	0.018*	0.015+
	(0.009)	(0.008)
Percent of ethnic minorities	0.066	0.029+
	(0.041)	(0.016)
Percent of employees younger than 20 years old	0.031+	0.020
	(0.017)	(0.012)
Percent of employees older than 51 years old	-0.018	-0.004
	(0.011)	(0.009)
Percent disable	0.034	0.008
	(0.035)	(0.029)
Percent temporary agency employees	-0.047	-0.003
	(0.004)	(0.011)
Between 5% and 25% of employee work on fixed-term contracts	0.002	0.002
	(0.002)	(0.003)
More than 25% of employee work on fixed-term contracts	-0.003	0.007
	(0.006)	(0.009)
Manufacturing	0.001	-0.009
	(0.006)	(0.007)
Utilities (electricity, gas, water supply)	-0.002	0.018
	(0.005)	(0.035)
Construction	-0.006	-0.004
	(0.005)	(0.009)
Wholesale	0.0003	-0.008
	(0.006)	(0.007)
Hotels and restaurants	-0.005	-0.014
	(0.008)	(0.011)

Transportation	0.004 (0.006)	-0.007 (0.007)
Financial services	0.009+ (0.005)	0.008 (0.008)
Other businesses	0.001 (0.006)	-0.001 (0.007)
Other community services	-0.006 (0.005)	0.003 (0.008)
Education	0.005 (0.007)	0.006 (0.007)
Health	-0.00002 (0.006)	-0.002 (0.008)
Public sector establishment	0.007+ (0.004)	0.004 (0.006)
East Anglia	-0.019* (0.009)	-0.005 (0.006)
Rest of the South East	-0.020+ (0.011)	-0.0001 (0.007)
South West	-0.018+ (0.010)	-0.003 (0.007)
London	-0.025 (0.017)	-0.004 (0.008)
East Midlands	-0.013 (0.012)	-0.003 (0.006)
West Midlands	-0.015 (0.011)	-0.006 (0.006)
North East	-0.017+ (0.010)	-0.005 (0.008)
North West	-0.017+ (0.009)	-0.005 (0.006)
Scotland	-0.016+ (0.010)	-0.007 (0.006)
Wales	-0.006 (0.014)	0.001 (0.009)
Sick pay in excess of statutory requirements	0.009* (0.004)	-0.004 (0.003)
System designed to minimize inventories, supplies or work in progress	0.001 (0.002)	0.0002 (0.003)
Operating at this address or other for more than 5 years	-0.018 (0.011)	0.002 (0.005)
Size of the establishment between 5 and 10 employees	---	0.005 (0.007)
Size of the establishment between 10 and 25 employees	0.013+ (0.007)	0.014+ (0.008)
Size of the establishment between 26 and 50 employees	0.013* (0.006)	0.011 (0.007)
Size of the establishment between 51 and 100 employees	0.009* (0.004)	0.010 (0.006)
Size of the establishment between 101 and 200 employees	0.005 (0.003)	0.001 (0.005)
Size of the establishment between 201 and 500 employees	0.006* (0.003)	0.009+ (0.005)
Size of the establishment between 501 and 1,000 employees	0.009** (0.003)	0.008 (0.006)

Organization size 200 to less than 1,000 employees	0.001 (0.006)	-0.001 (0.009)
Organization size 1,000 to less than 5,000 employees	0.004 (0.006)	-0.001 (0.009)
Organization size 5,000 to less than 5,0000 employees	0.003 (0.006)	0.001 (0.008)
Organization size more than 50,000 employees	0.003 (0.006)	-0.008 (0.009)
Working arrangements for non-managerial employees: annualised hours	-0.010** (0.003)	0.004 (0.005)
Working arrangements for non-managerial employees: shift working	0.006+ (0.003)	0.009** (0.003)
Specific health and safety committee	-0.005** (0.002)	-0.007* (0.003)
Teams jointly decide how the work is to be done	-0.001 (0.002)	-0.001 (0.003)
Joint consultative committee/work councils/representative forums	0.007* (0.003)	0.005 (0.004)
Briefing groups/team briefings	-0.001 (0.005)	0.004 (0.004)
Relationship between management and employees is very good/good	-0.003 (0.003)	-0.003 (0.004)
Unemployment rate by travel to work area between 2% and 5%	-0.006 (0.005)	0.0004 (0.004)
Unemployment rate by travel to work area above 5%	-0.003 (0.005)	-0.001 (0.005)
Number of observations	2,173	2,006

Notes:

1. The omitted categories are: no variably pay schemes, zero proportion of employees work on fixed term contracts, public administration, Yorkshire and Humberside, no sick pay in excess of statutory requirements, no system to minimize inventories, operating at this address or other less than 5 years, more than 1,000 employees at the establishment, less than 200 employees in the organization, no annualized hours, no shift working, general joint committee, team members do not jointly decide how the work is to be done, no joint consultative committee, no briefing, relationship between management and employees is neither good nor bad/poor/poor/very poor, unemployment rate by travel to work area between 0 and 2 percent.
2. Estimates are weighted and robust standard deviations in parentheses.
3. "---" implies that the variable does not exist in the 1998 WERS.

Table A4. Proportion of Variable Pay by Public-Private Status.

	1998		2004	
	Public	**Private**	**Public**	**Private**
PRP				
Individual or group PRP	23.6%	27%		
Payment by results			14.2%	37.6%
Merit Pay			19.9%	25.3%
Financial Participation Schemes				
Profit-related Pay	6%	52.1%	2.46%	41.83%
Employee Ownership		33.6%		
Other Forms of Variable Pay				
Deferred Profit	0.9%	10.7%		
Other cash bonus	13.6%	31.8%		
Coverage of workforce by PRP				
None	83.5%	79.3%	76%	56.4%
Less than half	4.9%	7.6%	10.2%	14%
More than half	11.6%	13.1%	13.8%	29.6%
Measure of Performance				
Individual	14.8%	17.8%	8.1%	26.8%
Group	7.2%	11.3%	5.5%	18.2%
Workplace	5.2%	7.7%	3.6%	13.3%
Organization	4.6%	9.9%	6.4%	12.8%

Notes. Percentages are weighted.